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Coding & Programming Equipment

Subject	Page

Coding & Programming Equipment

Model: All

Production: All

OBJECTIVES

After completion of this module you will be able to:

- Identify the equipment needed to perform a Coding or Programming session

- Determine what components make up a workshop network

- Understand the terminology used with regard to networks and configurations

- Connect the various components needed for Coding & Programming a vehicle

- Properly prepare a vehicle for Coding or Programming

Equipment and Software

Coding and Programming of a control module can only be performed within the workshop network using BMW Group Equipment and Software.

As of 2004 the standard diagnostic equipment available for a workshop consists of:

DISplus (Diagnostic Information System)

Used For: Vehicle Diagnosis, Coding, Programming and Individualization
(Refer to **SI B07 03 00**)

With PROGMAN (CD14) the DISplus will no longer be able to do coding and programming directly, it will only be used as a remote terminal that can initiate Coding & Programming through SSS.

Connection: Direct to LAN/Workshop Network or Direct to OPPS/OPS/Diagnostic Head

GT1 (Group Tester 1)

Used For: Vehicle Diagnosis, Coding, Programming and Individualization
(Refer to **SI B08 01 02**)

With PROGMAN (CD14) the GT1 will no longer be able to do coding and programming directly, it will only be used as a remote terminal that can initiate Coding & Programming through SSS.

Connection: Wireless LAN or Direct to LAN/Workshop Network or Direct to OPPS/OPS/Diagnostic Head

SSS (Software Service Station)

Used For: Vehicle Coding, Programming and Individualization. NO DIAGNOSTIC CAPABILITY.
(Refer to **SI B07 01 03**)

With release of PROGMAN (CD 14) the SSS becomes the only tool for performing Coding, Programming and Individualization. All requests from GT1 or DISplus will be performed by the SSS. The SSS can also be used to directly initiate a Coding, Programming or Individualization request.

SSS will be capable for coding/programming multiple vehicles, Max 5 vehicles at a time.

Connection: LAN/Workshop Network or Direct to OPPS/OPS Head

Diagnostic Head

Interface between vehicle and DISplus, GT1 or SSS

Used For:
- Vehicle Diagnosis, Coding, Programming and Individualization
  (Refer to **SI B08 01 02**)
- Not to be used for programming vehicles with a MOST bus (E60/63/64/65/66...)

Connection:
- Wireless to LAN/Workshop Network via access point
- Wireless connection direct to GT1
- Directly to LAN/Workshop Network using DK LAN cable
- Directly to GT1/DISplus/SSS using DK LAN Cable and adapter

Refer to section on Equipment Configuration

OPPS Head - (Optical Testing & Programming System)

Interface between vehicle and DISplus, GT1 or SSS

Used For:
- Vehicle Diagnosis, Coding, Programming and Individualization on Most bus equipped vehicles.
  (Refer to **SI B07 03 02**)
  Note: The OPPS is NOT ABLE to perform Diagnosis, Coding, Individualization & Programming on an I-bus equipped vehicle.
- Optical diagnosis of MOST and Byteflight Bus systems.
- Simultaneously program vehicles equipped MOST Bus system (except E65/66) via MOST Bus access port and OBD Connections.

Connection:
- Directly to LAN/Workshop Network connection using DK LAN cable or
- Directly to GT1/DISplus/SSS using DK LAN Cable and adapter.

Refer to section on Equipment Configuration

OPS Head - (Optical Programming System)

Interface between vehicle and DISplus, GT1 or SSS

Used For:

- Vehicle Diagnosis, Coding, Programming and Individualization
  (Refer to **SI B07 02 04**)
  Note: The OPS is not able to perform optical diagnosis of MOST Bus and Byteflight systems nor can it be used to perform Diagnosis, Coding, Individualization & Programming on an I-bus equipped vehicle.

Connection:

- Directly to LAN/Workshop Network or
- Directly to GT1/DISplus/SSS using DK LAN Cable and adapter.

Refer to section on Equipment Configuration

Deutronic Automatic Battery Charger

Used For:

- Maintaining proper vehicle battery voltage level during Diagnosis, Coding and Programming.
  (Refer to **SI B04 11 02**)

- Follow the initial setup of the charger as indicated in the SIB.

Connection:

- During Coding or Programming Procedure the battery charger must be in the Power Supply (PS) mode.

- Place the charger into the power supply mode by depressing the "MENUE" button 3 times in rapid succession.

Refer to section on Equipment Configuration

Hardware Operating Conditions

Device	Operating Temperature		Relative Humidity
GT1	+3°C - +43°C =	+37.4°F - +109.4°F	10 - 80% (no condensation)
OPPS/OPS	+3°C - +43°C =	+37.4°F - +109.4°F	10 - 90% (no condensation)
SSS	+10°C - +35°C =	+50F - +95°F	10 - 90% (no condensation)
Monitor SSS	+3°C - +35°C =	+37.4°F - +95°F	10 - 90% (no condensation)

Coding & Programming Software

Whenever coding and programming are to be performed on a vehicle, the latest version of software for DISplus/GT1 and SSS must be loaded/installed on the equipment being used.

The DIS CD xx contains the diagnostic programs (test modules, schematics, system status values...) prior to CIP 15.0 all coding and programming information for early production vehicles (E31, E32, E34, E36, E38, E39, E46, E53 and E52) was also available.

Note: With the introduction of CIP 15.0 all coding and programming information will be migrated to CIP and incorporated within Progman.

Whenever a new version of either DIS CD xx or CIP xx.x is released this indicates that an update or addition to a specific coding, programming or diagnostic routine has occurred. The change can be reflected by a new/updated programming software for a specific control module, the ability to code a new module or the ability to perform a new retrofit procedure when installing a new system.

Latest DIS CD xx

The latest information pertaining to the most current version of CD xx that is available and to be installed on all DISplus, GT1 and SSS units in the workshop can be obtained by referencing **SI B07 02 96**, on the BMWcenternet TIS website. The service bulletin provides clear instructions on loading the latest DIS CD xx and also identifies what modules in a vehicle require coding after being replaced.
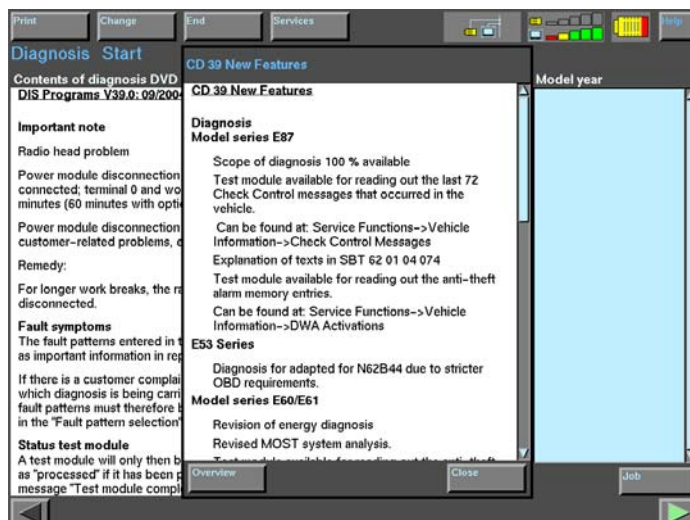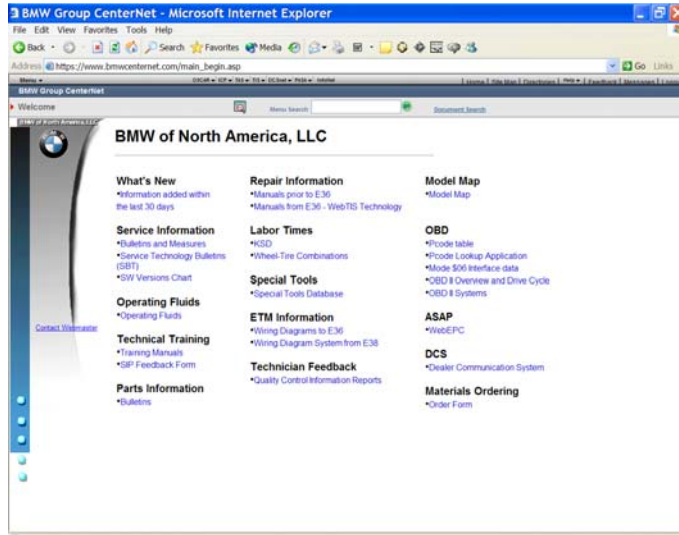

To determine what updates and additions occurred on DIS CD xx, currently installed on the DISplus/GT1:

Select **"Diagnosis"**
Select **"Services"**
Select **"News"**

All major changes are viewable in the "New Features" overview, pertaining to the CD installed.
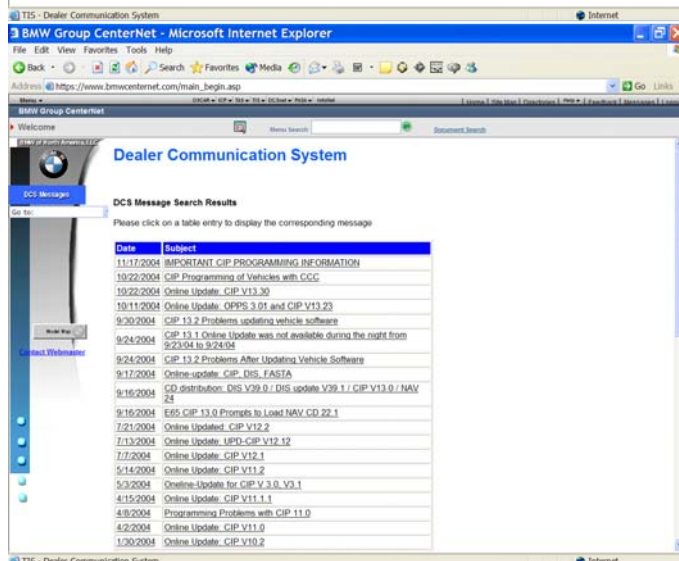
Latest CIP xx.x

The latest information pertaining to the most current version of CIP that is to be installed on all DISplus, GT1 and SSS units in the workshop, can be obtained by referencing DCS messages on the TIS website located at www.BMWcenternet.com

Select **"Dealer Communication System"**.
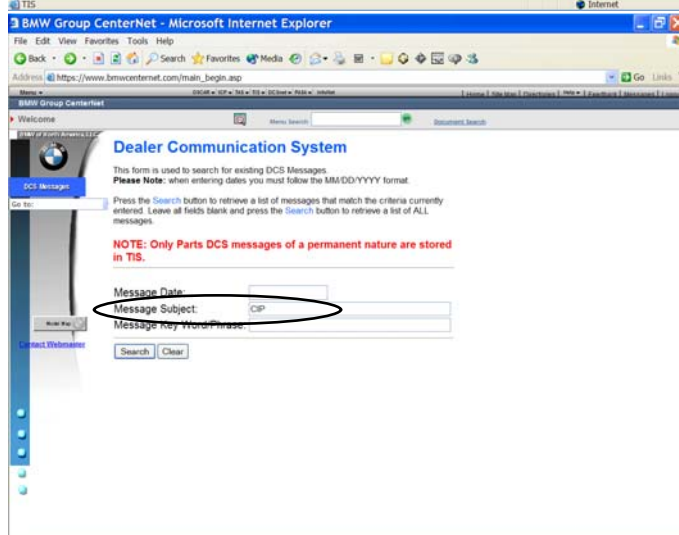
Enter "CIP" as a search criteria under "Message Subject".

A listing of the search results is displayed and the messages pertaining to what the latest CIP version is, can be accessed.

Coding & Programming Equipment

Networks

As the level of technology in our vehicles continues to increase so does the level of technology that we use in our diagnostic and programming equipment within the workshop.

In order to meet the ever growing demand for more rapid transfer of information we can no longer have multiple "stand alone" systems, therefore various infrastructures have been created to allow multiple "stand alone" devices/systems to interact with each other to share information.

The sharing of information with various control modules in our vehicles has been occurring for quite some time, now we will also be doing this with the diagnostic equipment in the workshop as well.

Vehicle Bus Systems

In order to make the components used in our vehicles more efficient we utilize bus structures (commonly referred to as I-Bus, K-Bus, MOST Bus, Byteflight, PT-CAN, etc.). By using bus structures in vehicles, we can accelerate communication between several different control modules. Many common vehicle systems (such as entertainment, safety, powertrain, etc.) are "stand alone" systems but also require information from other modules/systems in order to be more efficient. In order to obtain the required information the systems must also be able to simultaneously communicate without interfering with each other, which is accomplished by using various bus structures.

byteflight

Example:
The ISIS (Intelligent Safety Integration System) system on the E65 uses the Byteflight bus structure.

Depending on the equipment level of the E65, the ISIS may consist of 11 satellite components (Control Modules/Sensors) that are connected, using fiberoptic cables, to the SIM (Safety Information Module) which monitors the status of the satellite components. Since this is a safety system, components need to be activated within a fraction of a second in order to be effective, there can not be any processing delays. The SIM is connected to the ZGM (Central Gateway Module) which monitors the activity of the SIM and will direct information to the SIM and other devices in the vehicles as necessary.
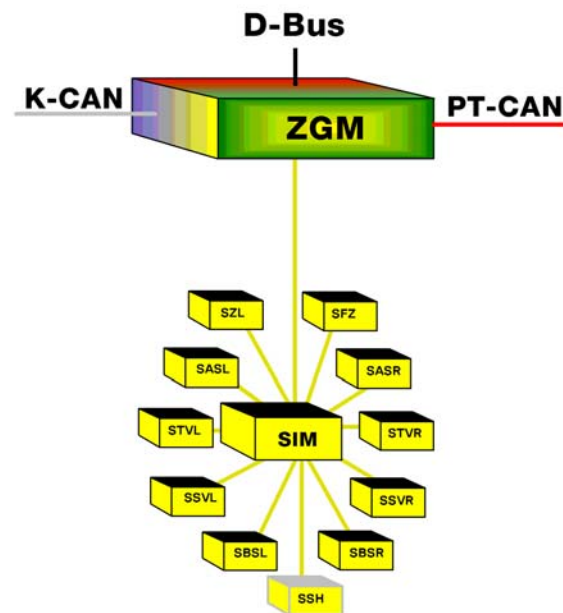
Workshop LAN Network

A network is nothing more than a group of devices interconnected so that they can communicate with each other. A LAN is a network that is localized to a specific area, such as a workshop or office.

The bus systems (I-Bus, K-Bus, PT-CAN, Byteflight, MOST Bus, ...) that we have been using in our vehicles for quite sometime, are nothing more than networks with different configurations. By looking at the byteflight system mentioned previously, a similarity to a workshop network can be established.


Workshop Network
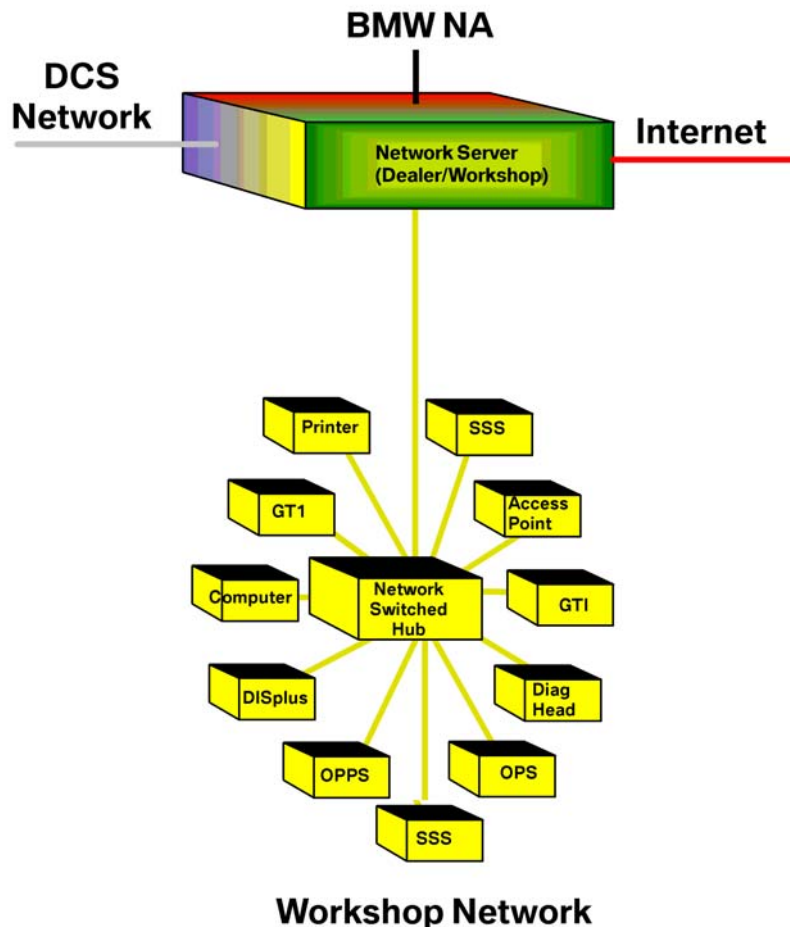
All workshops are currently equipped with a GT1, DISplus, SSS, OPS, OPPS, Diagnostic Head, Access Point, desktop computer(s) and printer(s) which can be considered as satellite components (control modules/sensors). In order for these components to communicate with each other, either directly or indirectly, they must be interconnected via a cable/wire to a common point or switching device. Consider the switching device/hub to be similar to the SIM, which monitors all devices connected to it and allows the devices to communicate with each other. The interconnection of these devices results in the establishment of a network localized to the workshop area thereby establishing a Local Area Network (LAN) in the workshop.

Network Structure

By having the workshop configured to allow the various devices used on a daily basis to be interconnected/networked with each other, as indicated in the illustration, additional components can easily be added and online updates can automatically be installed on all connected devices, as long as they have an approved IP address.

Example: *The network that exist in the workshop is not much different than the network structure that is used in our vehicles. In order for control modules to communicate with each other they must be correctly identified. The identification process can be considered to occur as part of the coding procedure which is done at the end of the assembly process or at anytime a new component/module/system is added to the vehicle. By not recoding the vehicle after adding or removing a module/system, the communication on a particular bus can be hampered especially if a response form a module that is no longer installed is expected or a new module transmits data that is not expected by anyone else on the bus because it is not correctly identified. The VO for a vehicle can be considered to contain the IP addresses of the modules installed in the vehicle.*

If the devices on the workshop network do not have a rigidly assigned IP address, online updates to specific devices can not occur. The operation/performance of a network can be greatly hampered if multiple devices share an address, since the transmitted data is not able to reach the correct device, it can result in jamming up the operation of the network.
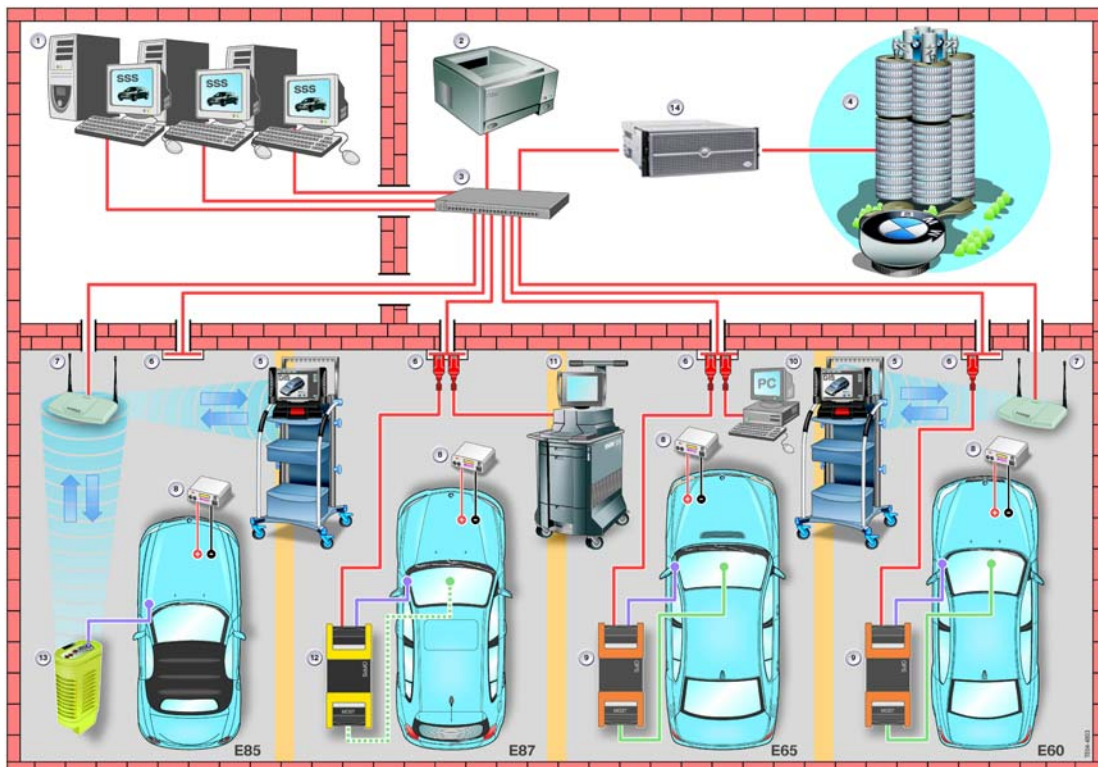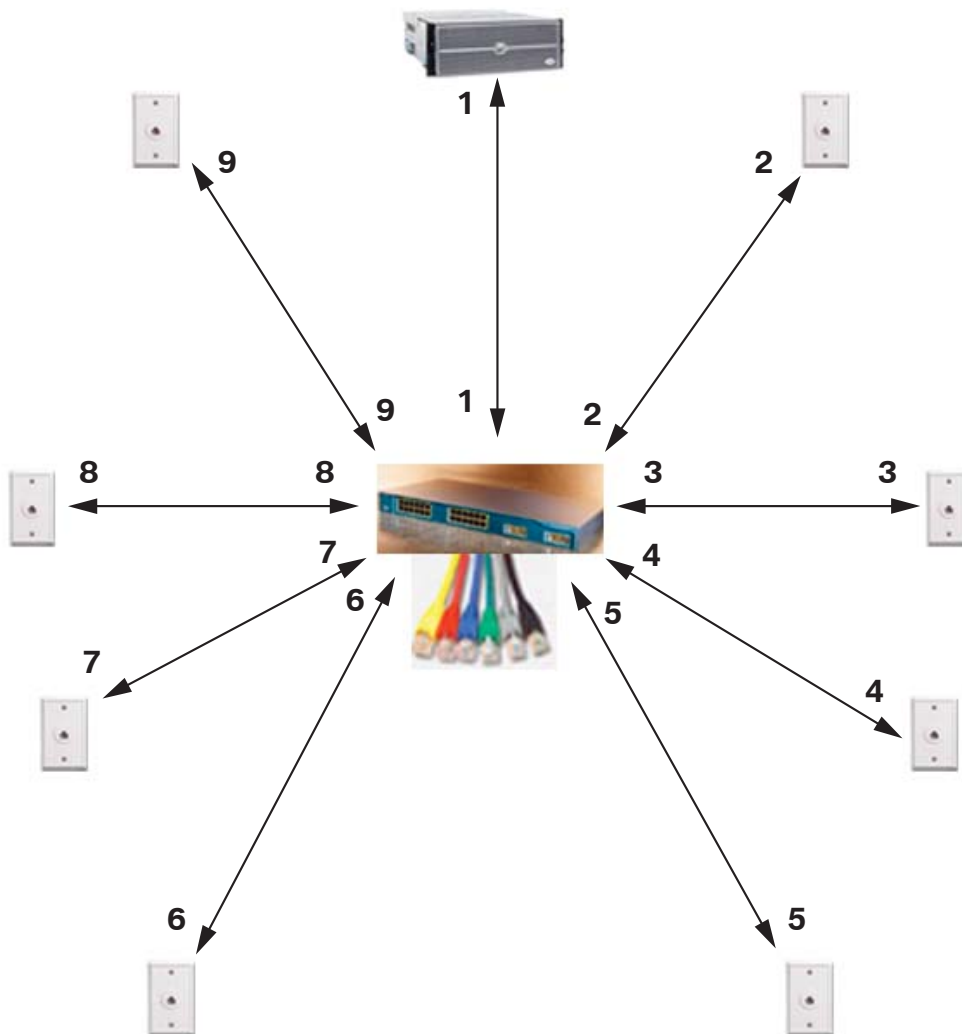
Network Connections

When establishing a network which will utilize multiple access terminals/jacks it is recommended that the jacks and cables attached to the specific jacks are numbered and that the corresponding end of the cable that connects to the router/switched hub should be numbered as well.

Example: *The illustration below shows a basic network structure with no miscellaneous devices connected, other than a Server and Switched Hub. The cables running to/from the Switched Hub are all numbered on both ends to make troubleshooting the network easier in the event of a problem with the cabling, wall jack or Switched Hub connections.*

Not having the cable and wall jacks number would be like trying to troubleshoot a problem with an electrical circuit in the vehicle where all the wires are the same color and the components connected have no pin assignments.
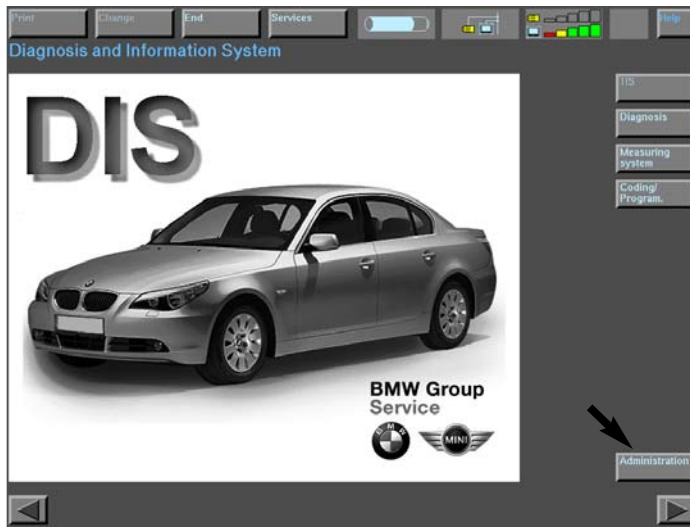

Network Connections

Once additional devices are connected it becomes very important that the configuration information (IP Address, Gateway Address, Subnet Mask and Device Name) is entered correctly for each device that is connected to the network. Each device must be assigned a specific/unique IP Address.

It is very important that the IP address not be shared by multiple devices located on the network, as this can result in "Locking-up" the network, which can have a detrimental effect on any control module(s) being programmed or coded.

Network Connections
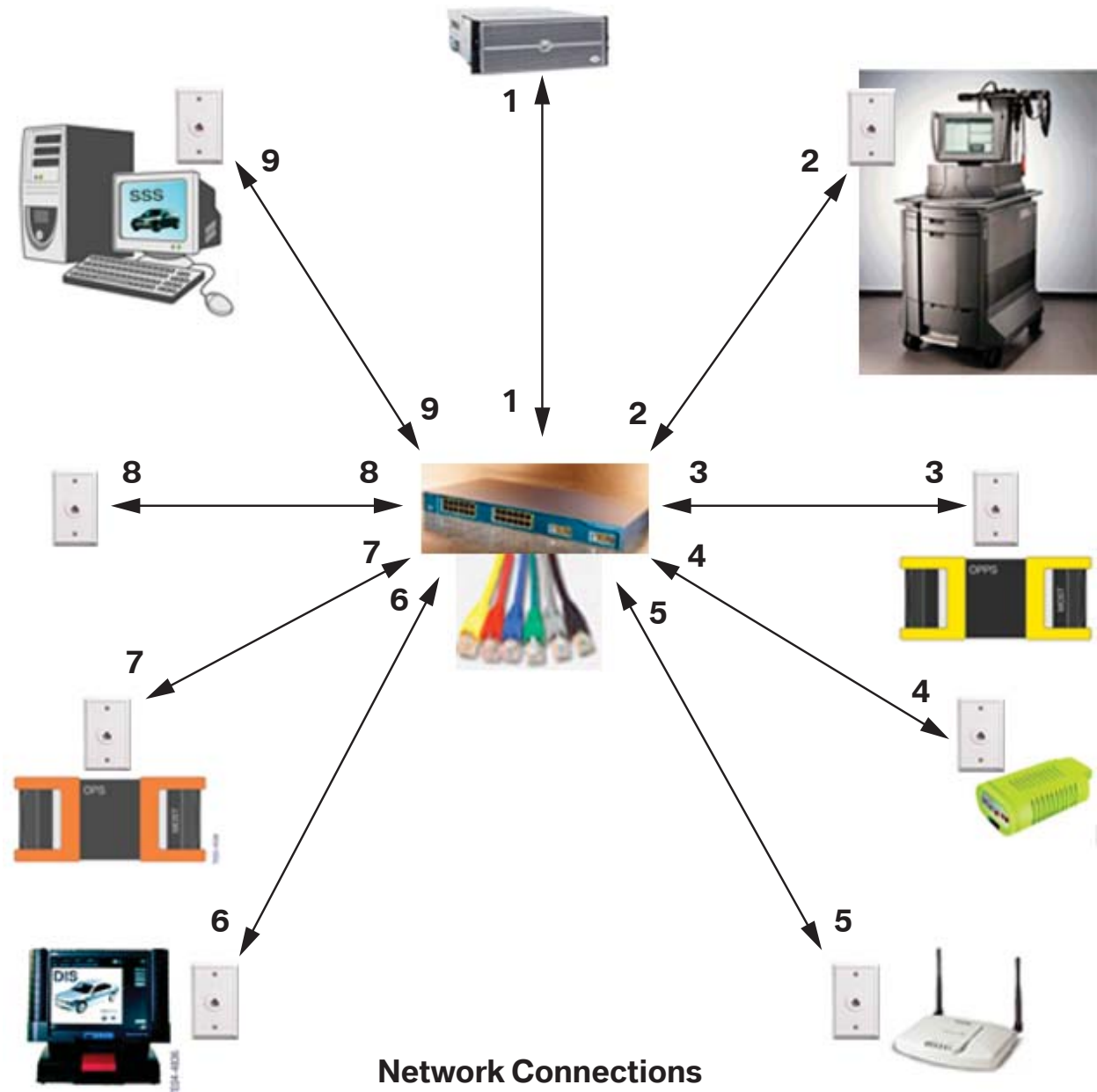
Accessing Configuration Information - DISplus/GT1 & Interface(s)

Select **"Administration"**.
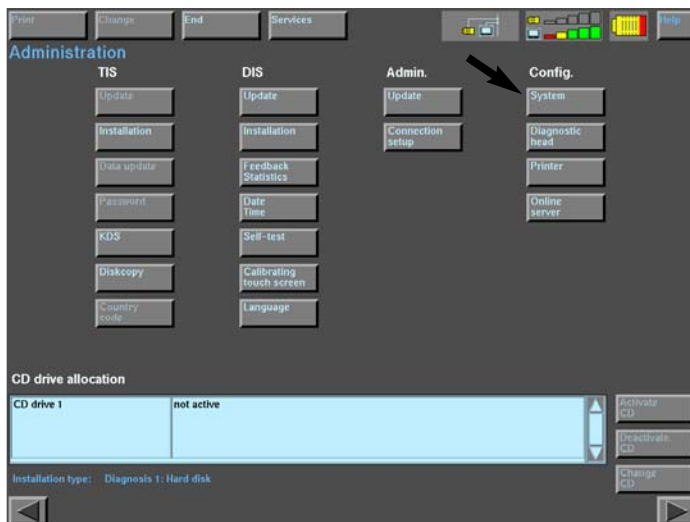
Select **"System"**.
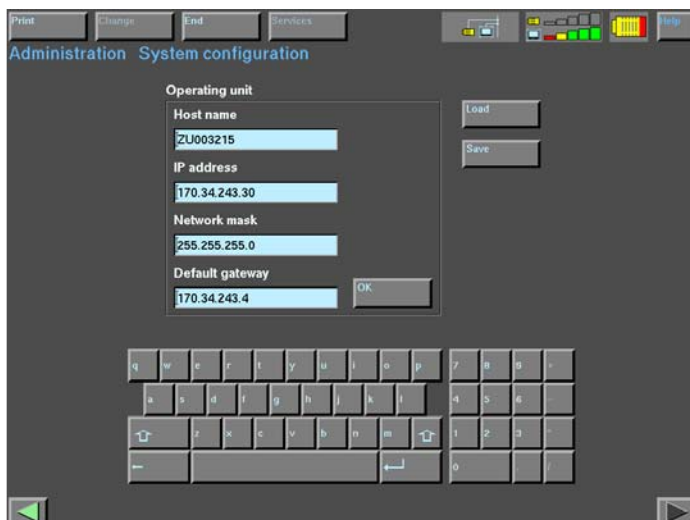
The screen now displays the network configuration information for the device being used DISplus/GT1.
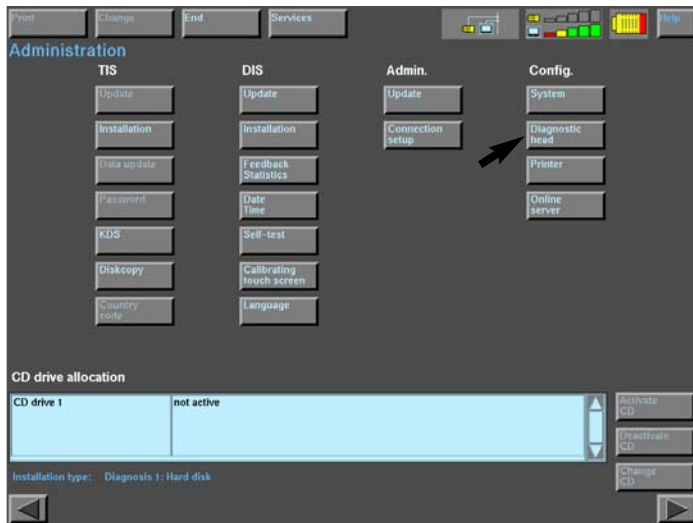
Select **"Diagnostic Head"**.
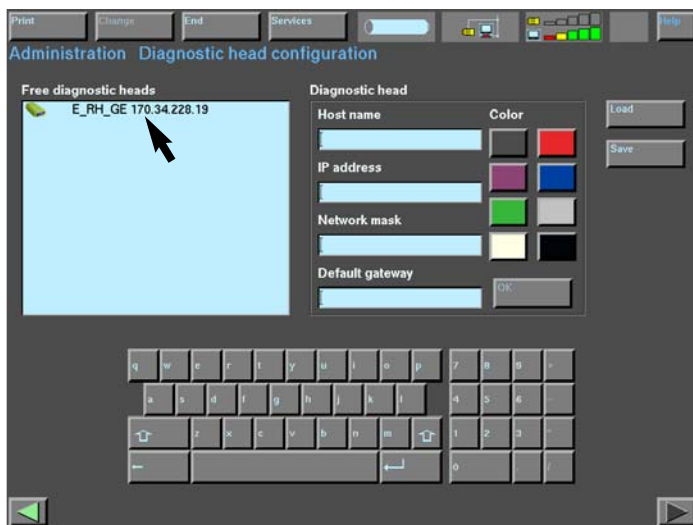
Select **"Free diagnostic head"**.

Note: In order for an interface to be displayed it must be connected to a vehicle and the ignition turned on.
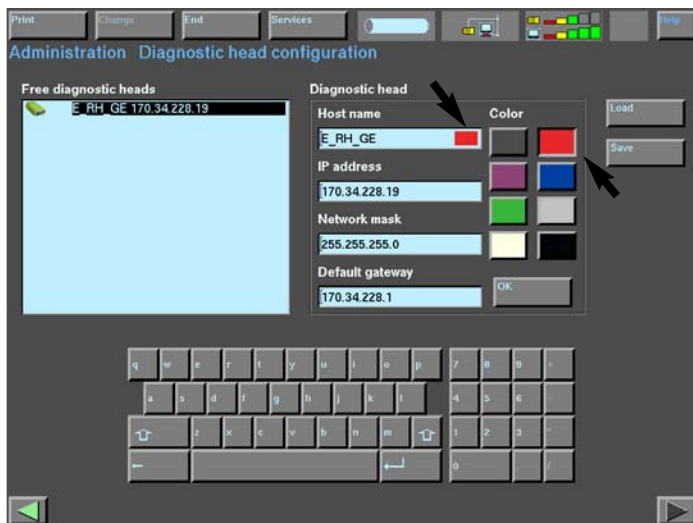
Network configuration information for the selected interface is displayed.

Example: *A red color band will be assigned to this interface once **"OK"** is selected.*

Workshop Layout

Coding & Programming Equipment
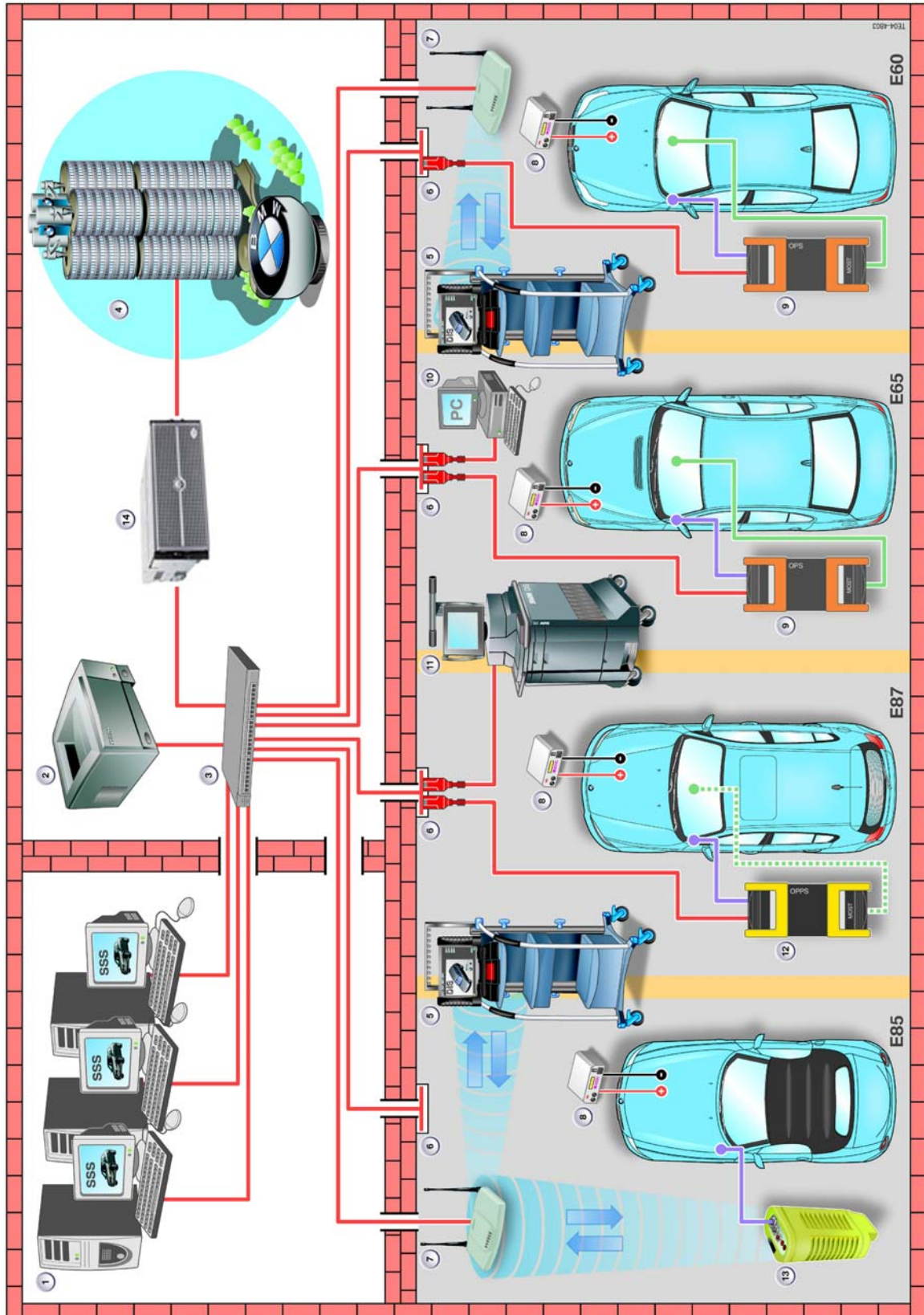
Workshop Layout Index

Device #	Device Name/Description
1	Software Service Station (SSS)
2	Network Printer
3	Switched Hub (Cisco Switch WS C2950-24)
4	BMW Network
5	GT1
6	Wall Jack/Ethernet Connection point to workshop Network
7	Access Point
8	Deutronic Automatic Battery Charger
9	OPS
10	Workshop PC
11	DISplus
12	OPS Head
13	Diagnostic Head
14	Network Server

Workshop Network Components

A LAN currently exists in all workshops to allow the diagnostic equipment (DISplus, GT1, SSS, OPPS, OPS & Diagnostic Head) to communicate with each other. In order to successfully diagnose, code and program a vehicle, it is required to have all equipment connected to the workshop network.

Components used to create a network infrastructure in the workshop consist of:

Access Point

Allows direct wireless access to LAN for GT1 and Diagnostic Head

OR

Diagnostic head establishes connection to LAN via wireless communication and thereby can be connected to DISplus or GT1, which are connected to LAN

Access point is connected directly to LAN.
Symbol - Model Spectrum 24/AP 3020-100

Wall Jack

Connection point for devices such as GT1, DISplus, Access Point, SSS, Diagnostic Head, OPPS/OPS Head, Printer and Network Server to Switched Router via RJ45 cable.

CAT 5 Ethernet Cable with RJ-45 Connectors

Used to establish a connection between:
- Wall jack and Switched Router/Hub
- Wall jack and devices such as GT1, DISplus, Access Point, SSS, Diagnostic Head, OPPS/OPS Head and Network Server.

Switched Hub

LAN switched distribution hub for all devices connected to the network. Routes communication telegrams/messages to specific devices from specific devices. Allows multiple devices to communicate with each other without reducing data transfer rate.
Cisco Switch WS-C2950-24

Server

Central computer which controls interface/communication between all devices on the Workshop LAN and communication to external networks and internet. Keystone device for network operation along with switch/router.

Common Terminology

Network
A group of computers that are interconnected with each other and able to communicate with each other either by transferring data via a wired or wireless connection.

Local Area Network (LAN)
A network that exists within a specific area.

Example: *By having all computers, testers and printers in the workshop interconnected results in a Workshop LAN.*

Ethernet
The term Ethernet is a communications protocol used to define a method & speed by which interconnected devices are able to communicate with each other by either a wired (twisted pair) or fiberoptic connection.

Common Ethernet communication protocol terms:

10BaseT - Able to transmit data at a rate of 10Mbps for a maximum distance of 100 meters per segment.

100BaseT - Able to transmit data at a rate of 100Mbps for a maximum distance of 1000 meters per segment.

The speed differences are obtained by modifying the method of encoding the data to be transferred. The maximum distance consist of the distance from switched hub to wall jack plus length of cable used to connect a particular device. The greater the distance the greater the chance of signal loss/disturbance.

Ethernet Cable (CAT 5)
A standard used to define an 8 wire cable (4 twisted pair) that is commonly used to inter-connect various computers in the establishment of an ethernet network. Certified to transmit data at a maximum rate of 100Mbps.

RJ-45 Connectors
The plastic connectors at the end of a CAT 5 cable, used to connect the cable to device/computer, wall jack and hub.

Wall Jack
Accepts RJ-45 connectors when connecting devices to the network. Connection point for devices like DISplus, GT1, SSS, OPPS, OPS, Diagnostic Head, workshop computers and printer.

Recommendation is that outlet/jack is numbered and the corresponding end of the ethernet cable connected to the switched hub is numbered as well, to assist in troubleshooting in the event of a problem.

Example: *A wall jack outlet is labeled as #1 the other end of the cable at the hub should also be labeled #1.*

Switched HUB

Allows multiple devices to send information over the network at the same time without slowing down the communication process. A switched hub essentially isolates the two devices that are communicating, thereby providing each component on the network a separate connection at the maximum data transfer rate of the network.

Example: *A switched HUB is similar to the use of cloverleafs on the highway, traffic does not need to stop if a change in direction needs to be made, plus traffic flows smoothly from point to point.*

A regular HUB does not provide each component with a separate connection point to the network but rather a shared connection point. By sharing a connection point the data transfer rate of the network is reduced when multiple devices try to communicate.

Example: *A regular HUB is similar to the use of a 4 way intersection, the smaller the amount of traffic using the intersection the quicker a car can go through the intersection and reach its desired destination. The greater the traffic the longer it will take for a car to reach its desired destination.*

The switched hub installed as part of the workshop wiring project is a Cisco WS-C2950-24.

Network Server

A computer that provides information/data to other computers located on the network. A server allows computers on its network to access information on another network, such as the internet. The server is the keystone device that allows computers on its specific network to access information on another network.

As an example a server can obtain and distribute software updates to all computers located on its network, instead of having to physically install the updates to each computer individually.

Automatic/Online Updates

The ability to connect the network server to the BMW server and check for new software updates (Diagnostic, Coding & Programming data) then downloads the information to all computers/equipment located on the network automatically at a specific time.

Example: *New updates can be installed on SSS, GT1 and DISplus overnight in order to have latest data available the next morning.*

The application that performs online updates is referred to as JETstream.

Access Point

The access point is a wireless communication device that is able to establish a wireless connection with a GT1 and/or a diagnostic head and allows them to communicate with other devices on the network.

Manufactured by Symbol - Model Spectrum 24 /AP 3020-100.
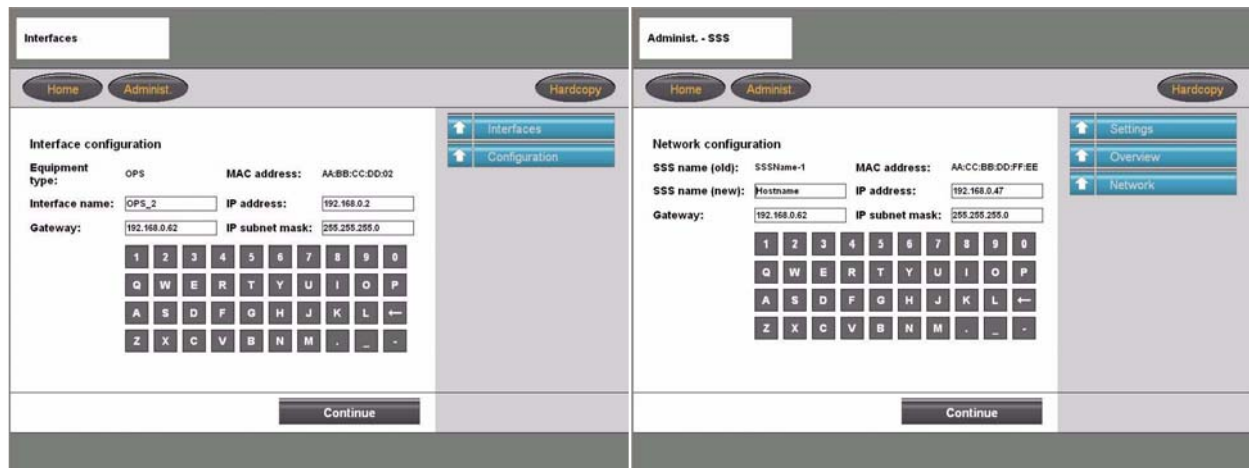
Interface Name
The specific name assigned to the device (Ex. OPS Blue A)

IP Address
It is a unique four segment number used to identify a specific device located on a specific network. The number represents the address of the device on the network and is necessary when communicating with other devices located on the network.

Example: *92.168.100.10*
Usually the first three segments are used to identify the network and the last segment identifies the device. The IP Subnet Mask information generally defines which segments are needed to identify the network and which identify the device.

In order for a devices on the network to communicate with other devices on the network it must know the addresses of those devices. If a print command is sent from a computer to a printer on the network, the command must be addressed specifically to the desired printer.

Example: *An IP address is no different than your home address, in order to receive a letter specifically directed to you, your name and address must be correctly displayed on the letter.*

IP addresses are assigned by the network administrator/provider and are rigidly assigned to the device(s) located within the workshop network, by entering it into the device during the initial setup.

IP Subnet Mask
This information is used to define which segment(s) of the four segment IP address specifically identifies the device and which identify the specific network.

Example: *255.255.255.0*
Indicates that the first three segments (255.255.255) identify the specific network that the device is located on. The last segment (0) indicates that this is the segment that will identify the specific device.

Gateway

This information identifies the four segment address of the component located on the network responsible for communicating from the current network to another network. If there is no address in this location then a connection to any devices outside of the current network can not be established.

Note: The network and device address information must be entered exactly as defined by the network administrator for your facility, otherwise the devices can not be accessed.
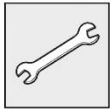
Workshop Exercise – Device Network Configurations

1. *Identify what version of DIS CD xx.x is installed on the DISplus/GT1.*

_____

_____

_____

2. *Identify what the latest version CIP xx.xx installed on the tester should be and approximately when it was released.*

_____

_____

_____

3. *Locate the network configuration information for the devices located on the network in the workshop area.*

_____

_____

_____

4. *What components of the configuration information are the same?*

_____

_____

_____

5. *What is the address of the workshop network?*

_____

_____

Remote Coding, Individualization & Programming Terminals

With the release of CIP 15.0 and the implementation of Progman (see Progman section for additional information) the DISplus and GT1 will only be capable of performing vehicle diagnosis and activation/initiation of a Coding, Individualization or Programming task through the SSS. A special program management tool (Progman) will only allow the DISplus and GT1 to act as remote terminals to the SSS (regarding Coding, Individualization & Programming), which means that the SSS will be the single supplier of Coding, Individualization and Programming information to a vehicle and its respective control modules. By having all devices (DISplus, GT1 and SSS) connected to the network, the DISplus and GT1 can be utilized to perform diagnosis on a new vehicle after a request for vehicle programming as an example, has been sent to the SSS for the current vehicle.

Example: *GT1(7) is connected to the LAN via access point (3) and to OPPS head (6) which is connected to LAN(4) and vehicle (5):*

1. *Diagnosis of complaint is completed and test module result indicates that a control module needs to be updated/reprogrammed.*

2. *Coding and Programming/CIP is accessed on GT1(7) and a request to program specific control module on vehicle (5) connected to OPPS head (6) is made.*

3. *The SSS (1) takes over the programming process and begins to reprogram the control module and recode the vehicle (5).*

4. *At this point the GT1(7) is free to connect to a new OPPS/diagnostic head and begin a diagnostic routine or initiate another programming/coding session on a new vehicle.*
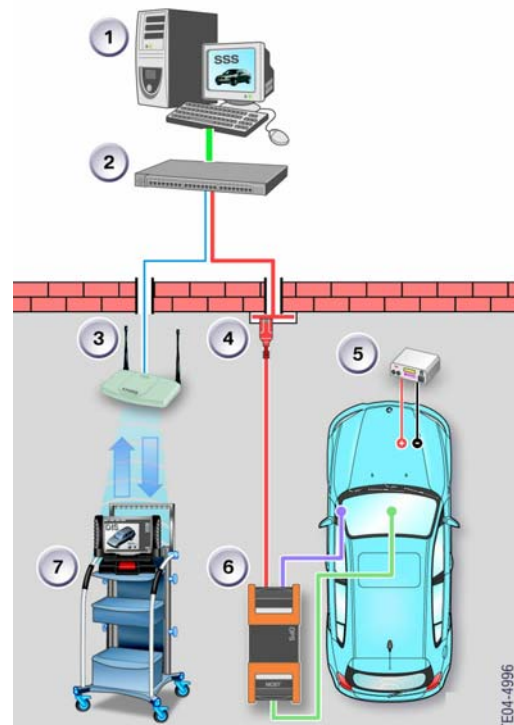
Software Service Station

The Software Service Station (SSS) was released to all centers for the sole purpose of Coding and Programming vehicles that can only be Coded/Programmed using CIP. The SSS is a dedicated desktop PC, that supplements the DISplus and GT1 diagnostic systems, since the SSS is only capable of performing Coding and Programming it frees up the DISplus and GT1 for diagnostic functions (refer to **SI B07 01 02**).

With the release of CIP 15.0 and the implementation of Progman, the SSS replaces the DISplus and GT1 (Group Tester One) diagnosis systems as the primary programming system. The DISplus and GT1 will only be able to send a request to Program or Code a vehicle directly through the SSS. The SSS performs the actual programming and coding process. In this configuration the SSS is able to program up to five vehicles at a time and the DISplus and GT1 are free to be used for other tasks, provided that all devices are connected to the workshop network and have been assigned specific IP addresses.

As with the DISplus and GT1, data is supplied to the Software Service Station by means of a CIP DVD-ROM or CD-ROM, additional data can also be provided by online updates via JETStream.

OPPS/OPS/Diagnostic Head

The OPPS (Optical Testing and Programming System), OPS (Optical Programming System) and the diagnostic head can all be used with the Software Service Station to serve as the interface to the vehicle. Optimal programming speed on MOST bus equipped vehicles is obtained by using the OPPS/OPS head connected to the OBD connector and directly to the MOST access port on E60, E63/64 and newer vehicles.

OPPS

The OPPS was first introduced with the E65 and is able to:

- Acts as interface between vehicle and DISplus/GT1/SSS

- Reduce programming time of MOST Bus control modules

- Diagnosis the fiber optic communication system utilized on the byteflight and MOST bus systems.

- Simultaneously program vehicles equipped with a MOST bus system (except E65/66 up to 3/05 prod.) via MOST Bus access port and OBD connections.

- Perform vehicle diagnosis, coding and programming on all vehicles equipped with a MOST bus..

- Communicates via a wired connection(DK LAN cable) to Network or directly to GT1/DISplus/SSS

The OPPS is NOT ABLE to perform Diagnosis, Coding & Programming on an I-bus equipped vehicle.

OPS

The OPS is able to:

- Acts as interface between vehicle and DISplus/GT1/SSS

- Reduce programming time of MOST Bus control modules

- Simultaneously program vehicles equipped with a MOST bus system (except E65/66) via MOST Bus access port and OBD connections.

- Perform vehicle diagnosis, coding and programming on all vehicles equipped with a MOST bus.

- Communicates via a wired connection(DK LAN cable) to Network or directly to GT1/DISplus/SSS

The OPS is NOT ABLE to perform Diagnosis on the fiber optic communication system utilized on the byteflight and MOST bus systems nor can it be used to perform Diagnosis, Coding & Programming on an I-bus equipped vehicle.

Diagnostic Head

The diagnostic head is able to:

- Acts as interface between vehicle and DISplus/GT1/SSS

- Perform vehicle diagnosis, coding and programming and Vehicle & Key Memory on most vehicles.
Should not be used for coding and programming vehicles equipped with a MOST bus (E60/63/64/65/66...) as processor is too slow.

- Communicates via a wired connection(DK LAN cable) to Network or directly to DISplus/GT1/SSS

- Wireless communication to LAN/Workshop Network Connection via Access Point

MOST Direct Access Port

The MOST Direct Access port is installed on vehicles equipped with a MOST bus such as E60/E62/E63.... The port is utilized to allow separate programming of control modules connected to the MOST bus when using the OPPS/OPS head for Programming & Coding. By using this port in conjunction with the OBD socket when programming a vehicle the overall programming/coding time is reduced.
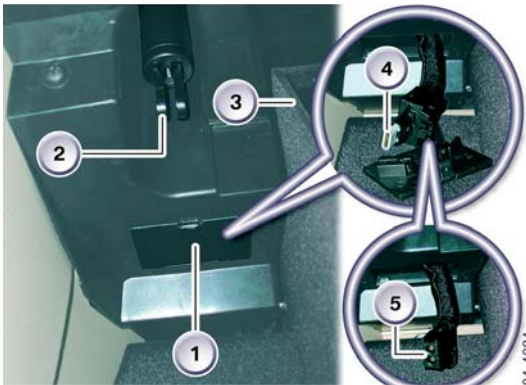
Access to the port differs corresponding to the model.

For E60 the port (5) is located on the left side of the glove box (3) behind the strut (2). To access the connection remove the cover (1) and remove the terminating plug (4) from the cable to allow connection to the port (5).

Example: *Referring to the illustration below - Parallel programming of an E60 using OPPS head in conjunction with short OBD cable (1) P/N 666 111 and MOST bus programming cable (2) P/N 663 121 which connects to the MOST Access Port located in the glovebox. The OPPS is connected to the network via DK LAN cable 3.*

NOTE: The OPS can be substituted for the OPPS.

Equipment Configurations

The diagnostic and programming equipment available in the workshop should always be configured to have the DISplus, GT1 and SSS connected directly to the LAN/Workshop network. **To ensure uninterrupted service/data transmission, it is highly recommended that the radio/wireless connection of the diagnostic head is NOT used to perform any type of Programming or Coding function.**

The normal configuration (when coding or programming) of the DISplus & GT1 to the diagnostic/OPPS/OPS head are as follows:


S09 02 U01
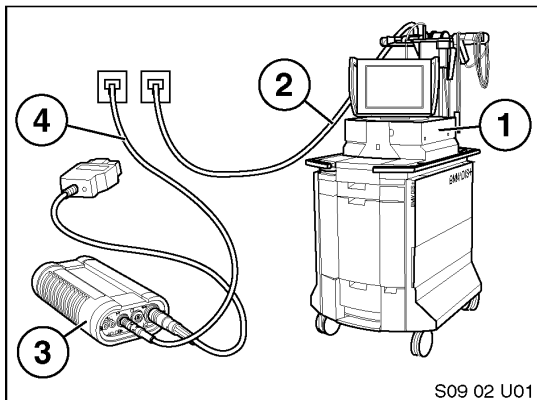
DISplus (1) - Connected to network using SI LAN cable (2)

+ Diagnostic/OPPS/OPS head (3) - Connected to network using DK LAN cable (4)

+ OBD or Diagnostic plug cable - Connecting diagnostic head to vehicle

S08 02 U10
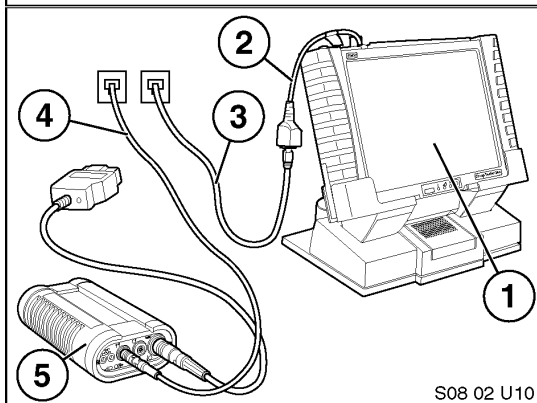
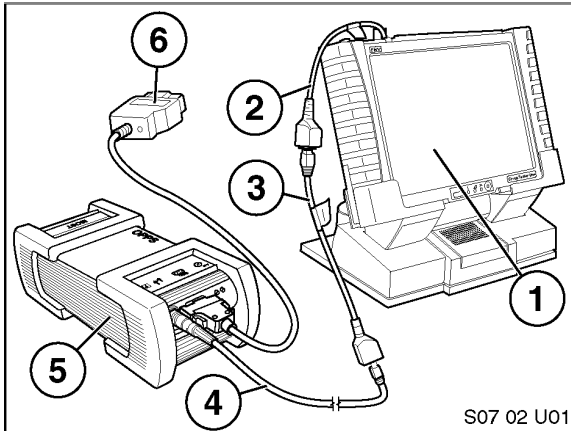### GT1 (1) - Connected to network using SI LAN cable (3) and LAN adapter BT1:1 (2)

+ Diagnostic/Opps head (5) - Connected to network using DK LAN cable (4)

+ OBD or Diagnostic plug cable - Connecting diagnostic head to vehicle.

S07 02 U14a
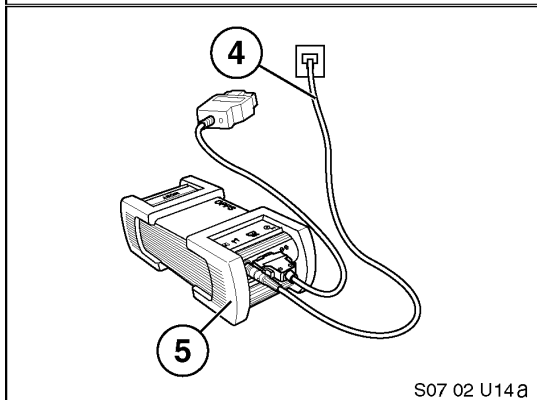
Note: For optimum programming speed the OPPS/OPS head (5) can be substituted for the diagnostic head:

+ Connect OPPS/OPS head (5) directly to a network drop via a DK LAN cable (4)

+ Connect OPPS/OPS head to the OBD connector using the short OBD cable P/N 663 111

In the event that the workshop network is disabled/down the DISplus and GT1 can still be used to diagnose a vehicle by utilizing the following configurations:

S07 02 U01

GT1 (1) - Not connected to network

+ Diagnostic/OPPS head (5) - Connected to GT1 using DK LAN cable (4) and LAN adapter BT1:1(2) plus LAN adapter BT X (3))

+ OBD or Diagnostic plug cable (5) Connecting diagnostic head to vehicle

S09 02 U01
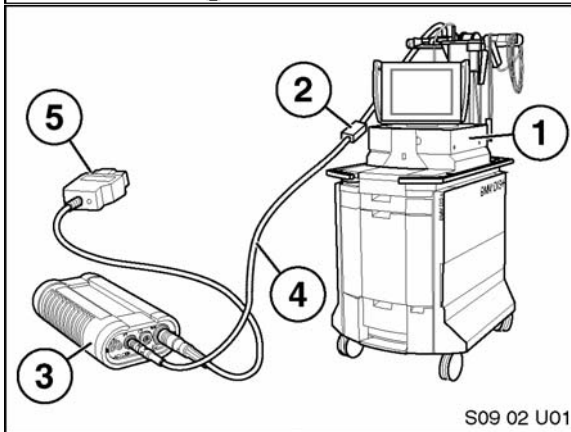
DISplus (1) - Not connected to network

+ Diagnostic/OPPS/OPS head (3) - Connected to DISplus using DK LAN cable (4) and PC LAN cable (2)

+ OBD or Diagnostic plug cable - Connecting diagnostic head to vehicle

Note: OPPS/OPS can not be used to perform diagnosis on an I-bus equipped vehicle (i.e. E32, E36, E38, E46, E53...).

Procedure for Coding & Programming

An important prerequisite for ensuring trouble-free programming is the correct preparation of the vehicle.

A diagnostic procedure must first be performed on the vehicle prior to any programming. Programming must not be started before faults in the vehicle electrical system are ruled out.

Correct preparation of the vehicle avoids errors during programming.

The programming procedure may be terminated if a bus signal is generated as the result of activation of electric loads during programming. The programming procedure should be repeated following termination. In exceptional cases it may be necessary to replace the control unit if communication is no longer possible.

Prior to beginning any programming or coding procedure some general guidelines need to be considered in order to ensure that the process goes as smoothly as possible:

Check	**Action**/Procedure
	Engine Turn off engine, ignition key on - KL15
	Manual gearbox/SMG Transmission in neutral. Parking brake applied.
	Automatic Transmission - Transmission in position P. - System temperature below 80°C. **Attention: Do not apply parking brake on vehicles equipped with the electromechanical parking brake.**
	Loads - All electric loads, lights and indicator lights switched off. - Wipe/wash system switched off. Insure that the wipers can move freely. Wipers may be activated during programming. **Do Not Block the Wipers.**

Check	**Action**/Procedure

Diagnosis

Perform quick test.

Using the diagnosis system, rectify any problems before programming and clear stored fault codes.

Battery

The battery should be sufficiently charged at the start of the programming procedure (12.6 V).

Battery Charger

IMPORTANT: Vehicles must be connected to the Deutronic Automatic Battery Charger prior to beginning the programming or coding procedure, this is the only approved battery charger for MOST bus-equipped vehicles.(see **SIB 04 11 02**).

During the programming or Coding procedure the battery charger must be in the Power Supply (PS) mode.

Place the charger into the power supply mode by depressing the "MENUE" button 3 times in rapid succession.

Do not connect or disconnect the charger during programming. The system voltage must not drop below 12.6 V during the programming procedure.
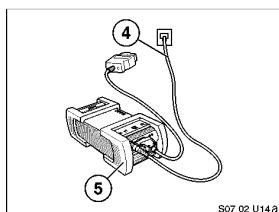
<u>DO NOT USE Radio Connection for Programming or Coding!!</u>

Diagnostic head/OPPS head (5) must be connected directly to a network drop to ensure uninterrupted programming.

The DK LAN cable (4) MUST NOT BE routed through an open window of the vehicle,leave a door open.

Programming

Check CKM values, also observe individual settings on the vehicle if applicable, start programming procedure.

Attention: The data status of the Software Service Station must always be kept updated!

Make sure that no switches, radio etc. are operated during programming as this could terminate the programming procedure.

DO NOT TOUCH CODING/PROGRAMMING ACTIVE !!

Review Questions

1. *What vehicles can not be programmed using a diagnostic head?*

   _____

   _____

   _____

2. *How can an OPPS or OPS Head be used to speed up the coding or programming process? On what vehicles can the procedure not be used?*

   _____

   _____

   _____

3. *What does it mean when a new DIS or CIP version (CD/DVD) is released?*

   _____

   _____

   _____

4. *What is the similarity between our vehicle bus structure and a workshop network?*

   _____

   _____

   _____

5. *What is the importance of an IP address? What can happen if the address is shared?*

   _____

   _____

   _____

6. *What are the steps that should be followed prior to starting a Coding or Programming session?*

   _____

   _____

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